TRAINING INTENSITY AND PHYSIOLOGY FOR ROWING

The following is a paper put together by former 2009 PLC coach and Australian Olympic Mens rowing representative Jeremy Stevenson. Jeremy is arguably the best mens rower in Australia at present and has recently taken 2 yrs off to focus on a Masters in Robotics, before recommencing his training for another Olympic campaign.

Jeremy coached our current yr11 girls last year. Here is some enlightening information and explanations.

I thought I'd impart you all with some wisdom again. This time it’s Physiology and Sports Science. Read it at your leisure, it will help your performance understanding these concepts.  
  
You might've heard the coaches harping on about heart rates lately and most of you don't know why or the relevance of heart rates. Heart rates are the most practical measure we have to ensure you are getting physical benefit during training. Perceived exertion is another but only becomes relevant once you've trained hard for a number of years. Your heart rate is a measure of how hard you are working, relative to yourself and your current fitness. Heart rate itself isn't a reflection of your fitness, that is your heart rate:output ratio. Training increases your sustainable output at a heart rate. Each training zone causes different physiology adaptations, relevant to different sports. As rowing is a strength/aerobic sport (with a race lasting 5-7min) we train in the higher aerobic levels (T2, T3, T4).

Trust that training sessions are designed to have you working in the correct zones (assuming you apply yourselves fully) to give you the best physiological adaptation for the head of the river. There is no replacement for hard work. I'm sure you are all well versed in finding things on wiki if you want to look into this more, but this is an explanation of training zones in our context.  
  
There are 5 aerobic major heart rate zones and 1 anaerobic zone, these do shift slightly depending on how fit you are and your age but these zones are a rough guide. The lower your heart rate the longer you need to exercise to achieve the same benefit (up until T4,T5 which have a different training effect). Most of our training is should be the upper end of T2 to low T4:  
**T1 120-140bpm (65-75%)** - Starts at around 120, it is your aerobic threshold. The primary energy source is fat. In order to effectively train in this region you need to do LONG sessions, we are talking 3+ hours non stop to get any sort of benefit. If you are training for our sessions in this zone you are wasting your time. Training in this zone increases your aerobic efficiency but it is something you need to do 3-4 times a week for a long time to see any benefit. You are only really going to get an opportunity to do this on a bike.  
**T2 140-160bpm (75-82%)** - This minimum paddle pressure (as in absolute minimum), effective training time for this training zone is **1 to 3 hours** consistently which is on the edge of what we can do. You are burning fat and glycogen (energy stored in your muscles) in this zone (which highlights the need for you to eat carbohydrate before the session). This zone and T3 increases your aerobic efficiency and capacity and is therefore the main training we will do. Another measure of this zone is you shouldn't be able to talk because you are breathing. Breathing should be starting to get hard, if you can speak easily you aren't in this zone.  
**T3 160-175 (82-89%)** - This should be hard paddling for **30m-1hr**. Given how regularly we stop the boats this is more than realistic as a paddling training zone. T3 will have you breathing hard (not talking) and you should be feeling some muscle discomfort (due to lactic acid) but you breathing is dealing with it. Whether you think it is or not, it is maintainable. This uses glycogen as its primary energy source.  
**T4 175-185 (89-93%)** - We won't do this often but you should be hitting this during the exercises in the circuits we do. It is maintainable for **7-30 minutes**, what most rowers call time trial pace. If you are tough you will be able to paddle in this zone. We are using glycogen mainly here with a bit of glucose.  
**T5 185-195 (93-95%) -**This is race pace**.**Your lactic acid level should be very high and you should be very uncomfortable, it is going to be maintainable for the length of the race but you won't be able to do much afterwards. This is the last point where your body can do anything maintainable for more than 30 seconds. You have max **6 or 7 minutes** in this zone. We are now using glucose which you would know as blood sugar.  
**T6 195+ (95%-100%)** - This is your anaerobic zone (transport), this shouldn't be maintainable for an extended time. It where your body is producing lactic acid (the burning feeling) at a rate that your lungs and heart cannot process it. Your body will stop you from using this pretty quickly. This is the first **100m**and last 100m of the race. Working in this zone actually uses no oxygen or energy source at the time but will as you process the lactic acid over the next minutes.  
  
If you are in doubt to what zone the work you are doing should be in, ask your coach. We need to aim to empty the tank every session.  
  
**Warm ups**  
As we head into racing we will be going over some pre-race warm up routines with you. Warm ups are not only to prevent injury but to bring your body up to a point where it can perform at it's best. This means engaging your aerobic system, so your aerobic system is working as you start the race. This is going to require some fairly hard exertion before the race in the form of a 3-4 minute piece around T3-T4 and some short racing pieces. That means you should feel your blood pumping and you should be breathing on the start line. We will plan our run so you get to the start line with 5 minutes to start.  
What ever your warm up is, you need to commit to it and do it properly. Otherwise your aerobic system will not be running and after your anaerobic start, things will hurt far worse than they need to. This will result in your perceived exertion going very high and you will drop back to a T3 or T4 output to try to clear the lactic acid, by then you will be behind and try to go anaerobic again and the race will be a lot harder. Alternatively with your aerobic system engaged, the lactic acid peak from your start is lower as lactic acid is processed through the start (you will be able to push a higher output too), similarly after the start it is easier to fall into T5 and you will be in front. This applies to your ergos too, you would've all pulled better scores probably up to 10-20s quicker if you took my advice. Energy stores are not a limiting factor in a 1.5/2km race.  
  
**Nutrition**  
I'm not sure what was said in the nutrition talk but sports nutrition and everyday nutrition differ. Your blood sugar levels are at their lowest throughout the day after you wake up, so priority #1 for pretraining food is carbohydrates. Protein is good after training, but it has little benefit for the training you are about to do. It is something you need to have consistently in your diet to have any effect (its absorbed slowly), protein binges are next to useless as your body just gets rid of it straight away. Protein isn't an energy source and you will lose muscle and be less capable to train if that is all you are eating prior to training. There are some other symptoms associated with training on low blood sugar which are similar to diabetes. So eat a banana, some toast, milo or cereal. Glycogen is an important energy source and is a reflection of your energy consumption over the previous days. Carbohydrates are first turned to glucose and then glycogen after some time, if you eat before the training this should be replacing your glycogen stores while rowing. Eating a carbohydrate source in the 30minutes after training is crucial if you want to be able to train at your max heart rate. So apply sports nutrition (what I mentioned) in the day leading up to a training up until immediately after training and on days you don't have training apply everyday nutrition.  
  
People talk about 1%ers making the difference in racing. Well these are most of the other 99% and are therefore non-negotiable.